REMARKS

Claims 1, 4, 5, 8, and 14-29 are all the claims presently pending in the application. Claims 1, 19, 20, and 25 are amended to more particularly define the invention. Claims 28 and 29 are added to claim additional features of the invention. No new matter is entered.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1, 16, and 19 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being allegedly unpatentable over claim 6 or 31 of copending Application No. 12/155,991 in view of Harwig et al. ("Electrical Properties of β-Ga_2O_3 Single Crystals. II", Journal of Solid State Chemistry Vol. 23, pages 205-211, 15 January 1978).

Claims 1, 4, 5, 8, 19, 21, 25, and 26 stand rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the written description requirement. Claims 1, 4, 5, 8, 21, and 26 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite.

With respect to the prior art, claims 1, 4, 5, and 19 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Harwig. Claims 8, 16, 18, and 21 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Harwig in view of Ichinose et al. (U.S. Patent Publication No. 2004/0007708 A1). Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Harwig in view of Ueda et al. ("Synthesis and Control of Conductivity of Ultraviolet Transmitting β-Ga_2O_3 Single Crystals", App. Phys. Lett. 70 (26), 30 June 1997).

The rejections mentioned above are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

An exemplary aspect of the claimed invention (e.g. as recited in claim 1 and similarly in claim 19) is directed to a method of controlling a conductivity of a Ga_2O_3 system single crystal, including adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of the Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant. The n-type dopant includes one of Zr, Si, Hf, Ge, Sn, and Ti.

Another exemplary aspect of the claimed invention (e.g. as recited in claim 16) is directed to a method of controlling a conductivity of a Ga_2O_3 system single crystal, including contacting a Ga_2O_3 polycrystalline raw material including a predetermined dopant to a Ga_2O_3 seed crystal, and growing the Ga_2O_3 system single crystal on the Ga_2O_3 seed crystal such that the predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal to obtain a desired resistivity in the Ga_2O_3 system single crystal of 1×10^3 Ωcm or greater. The predetermined dopant includes a p-type dopant for controlling the conductivity of the Ga_2O_3 system single crystal, the p-type dopant including one of H, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Mn, Fe, Co, Ni, Pd, Cu, Ag, Au, Zn, Cd, Hg, Tl, and Pb.

Conventional methods of controlling the conductivity of a Ga_2O_3 system single crystal have been used to control resistivity of the Ga_2O_3 system single crystal when a conductive property is required. Conventional methods, however, possess several different drawbacks. It is difficult using conventional methods to widely control the resistivity because a substrate or thin film made of the Ga_2O_3 system single crystal naturally tends to have an n-type conductive property. It is also difficult using conventional methods to make a substrate or thin film of the Ga_2O_3 system single crystal having a high insulating property despite the necessity of such a Ga_2O_3 system single crystal (Application at page 3, lines 8-21).

On the other hand, an exemplary aspect of the claimed invention includes a method of controlling a conductivity of a Ga_2O_3 system single crystal, including adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of the Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant (Application at Figure 2). Further, another exemplary aspect of the claimed invention includes a method of controlling a conductivity of a Ga_2O_3 system single crystal, including growing the Ga_2O_3 system single crystal on the Ga_2O_3 seed crystal such that the predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal to obtain a desired resistivity in the Ga_2O_3 system single crystal of 1 X 10^3 Ωcm or greater (Application at page 20, line 16 to page 21, line 15).

Since the claimed invention provides that the resistivity of the Ga_2O_3 system single crystal is substantially linearly changed in correspondence to a dopant concentration of the n-type dopant added, for example, the resistivity and the carrier concentration of the Ga_2O_3 system single crystal can be substantially linearly changed and controlled by adding a certain amount of n-type dopant with a predetermined concentration to the Ga_2O_3 system single crystal as shown in Figure 2 of the Application. Thus, it is possible to fabricate a Ga_2O_3 system single crystal of which resistivity is changed substantially linearly.

II. THE NONSTATUTORY OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION

The Examiner alleges that the combination of claim 31 of copending Application No. 12/155,991 and Harwig makes the invention of claims 1 and 19 obvious. The Examiner also alleges that the combination of claim 6 of copending Application No. 12/155,991 and Harwig makes the invention of claim 16 obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would combine claim 31 of copending Application No. 12/155,991 and Harwig, the resultant combination clearly fails to teach or suggest all of the features of the invention of claims 1 and 19. Specifically, the alleged combination of claim 31 of copending Application No. 12/155,991 and Harwig fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of said Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant*", as recited in claim 1 and similarly in claim 19 (Application at Figure 2).

Claim 31 of copending Application No. 12/155,991 recites "adding an n-type dopant onto the insulation substrate to form a thin film exhibiting n-type conductivity." This portion of claim 31 of copending Application No. 12/155,991 is relied upon by the Examiner to allegedly teach the aforementioned exemplary feature.

However, as can be clearly seen, claim 31 fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of said Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant . . . .*" Further, Harwig is only applied by the Examiner to allegedly teach specific n-type dopants and clearly fails to make up for the deficiencies of claim 31 of copending Application No. 12/155,991. Thus, the Examiner fails to make a *prima facie* case of obviousness with respect to claims 1 and 19.

With respect to claim 16, even assuming (arguendo) that one of ordinary skill in the art would combine claim 6 of copending Application No. 12/155,991 and Harwig, the resultant combination clearly fails to teach or suggest all of the features of the invention of claim 16. Specifically, the alleged combination of claim 6 of copending Application No. 12/155,991 and Harwig fails to teach

or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . growing the Ga_2O_3 system single crystal on the Ga_2O_3 seed crystal such that said predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal to obtain a desired resistivity in the Ga_2O_3 system single crystal of 1 X 10^3 Ωcm or greater*" as recited, for example, in claim 16 (Application at page 20, line 16 to page 21, line 15).

Claim 6 of copending Application No. 12/155,991 clearly fails to teach or suggest the aforementioned exemplary feature. Indeed, claim 6 of copending Application No. 12/155,991 certainly fails to teach or suggest that a predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal or that a desired resistivity in the Ga_2O_3 system single crystal is 1 X 10^3 Ωcm or greater. The Examiner only applies Harwig to allegedly teach specific p-type dopants. As a result, Harwig fails to make up for the deficiencies of claim 6 of copending Application No. 12/155,991. Thus, the Examiner fails to make a *prima facie* case of obviousness with respect to claim 16.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

III. THE DRAWING OBJECTIONS

The Examiner alleges that a method of controlling a conductivity of a Ga_2O_3 system single crystal, "comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal to change a resistivity of said Ga_2O_3 system single crystal *linearly* with an added amount of the n-type dopant", as was previously recited in claims 1 and similarly in claim 19, is not shown in the drawings. (emphasis added).

Applicants respectfully disagree. Referring to the contents of Figure 2 and the description of paragraph [0039], it is clear that Figure 2 shows the above-referenced feature. In Figure 2, it is

understood that, when Si dopant is increased, the resistivity decreases and the carrier concentration increases by increasing the Si dopant concentration. In other words, referring to Figure 2, it is specifically understood that, when the Si dopant is increased from 1 X 10^{-4} mol% to 1 X 10^{-1} mol%, the resistivity linearly decreases from 8 X 10^{2} Ωcm to 2 X 10^{-3} Ωcm and the carrier concentration linearly increases from 5 X 10^{15} cm^{-3} to 2 X 10^{19} cm^{-3}.

Furthermore, paragraph [0039] of the Application describes that, in accordance with the added amount of the dopant, it is possible to change the resistivity of Ga_2O_3 system single crystal to which the dopant is added. In addition, paragraph [0034] of the Application describes that it is possible to use, for example, an FZ method as a method of controlling the dopant concentration. In other words, in the claimed invention, it is possible to change the resistivity in proportion to the dopant concentration as understood by referring to Figure 2. Thus, it is clearly possible to linearly control the resistivity and the conductivity by controlling the amount of the dopant which is added to the Ga_2O_3 system single crystal.

While Applicants respectfully disagree with the Examiner and submit that this exemplary feature is clearly shown in Figure 2, to expedite prosecution, claims 1, 19, and 20 are amended to alleviate the Examiner's concerns. Specifically, claim 1 is, and similarly claims 19 and 20 are, amended to recite a method of controlling a conductivity of a Ga_2O_3 system single crystal, "comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of said Ga_2O_3 system single crystal *substantially linearly* with an added amount of the n-type dopant".

However, Applicants respectfully disagree with the Examiner's allegation that the feature "contacting a Ga_2O_3 polycrystalline raw material comprising a predetermined dopant to a Ga_2O_3 seed crystal" recited in claim 16 must be shown in drawings. Specifically, a drawing for this exemplary

feature is clearly not needed by one of ordinary skill in the art to understand the subject matter being claimed.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these objections.

IV. THE 35 U.S.C. § 112, FIRST PARAGRAPH REJECTIONS

The Examiner alleges that "fig.2 does not show any linear relationship between the resistivity of the Ga_2O_3 system single crystal and the added amounted (sic) of the n-type dopant." (Office Action at page 6, paragraph 9).

Again, as mentioned above, Applicants respectfully disagree. Referring to the contents of Figure 2 and the description of paragraph [0039], it is clear that Figure 2 shows the above-referenced feature. In Figure 2, it is understood that, when Si dopant is increased, the resistivity decreases and the carrier concentration increases by increasing the Si dopant concentration. In other words, referring to Figure 2, it is specifically understood that, when the Si dopant is increased from 1×10^{-4} mol% to 1×10^{-1} mol%, the resistivity linearly decreases from 8×10^{2} Ωcm to 2×10^{-3} Ωcm and the carrier concentration linearly increases from 5×10^{15} cm^{-3} to 2×10^{19} cm^{-3}.

Furthermore, paragraph [0039] of the Application describes that, in accordance with the added amount of the dopant, it is possible to change the resistivity of Ga_2O_3 system single crystal to which the dopant is added. In addition, paragraph [0034] of the Application describes that it is possible to use, for example, an FZ method as a method of controlling the dopant concentration. In other words, in the claimed invention, it is possible to change the resistivity in proportion to the dopant concentration as understood by referring to Figure 2. Thus, it is clearly possible to linearly

control the resistivity and the conductivity by controlling the amount of the dopant which is added to the Ga_2O_3 system single crystal.

While Applicants respectfully disagree with the Examiner and submit that this feature is clearly shown in Figure 2, to expedite prosecution, claims 1, 19, and 20 are amended to alleviate the Examiner's concerns. Specifically, claim 1 is, and similarly claims 19 and 20 are, amended to recite a method of controlling a conductivity of a Ga_2O_3 system single crystal, "comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal to change a resistivity of said Ga_2O_3 system single crystal *substantially linearly* with an added amount of the n-type dopant".

However, Applicants respectfully disagree with the Examiner's allegation at page 7, paragraph 10 of the Office Action, alleging that the recitation of "exclusively dependent" is not supported by the original specification. Indeed, the original specification clearly supports this exemplary feature at page 15, lines 13-19.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

V. THE 35 U.S.C. § 112, SECOND PARAGRAPH REJECTIONS

The Examiner alleges that "[t]he recitation, 'wherein said n-type dopant . . . and Ti' in lines 7-8 of claim 1 renders claim (sic) indefinite . . . ." While Applicants respectfully disagree and respectfully submit that one of ordinary skill in the art would clearly understand the claim as previously presented, to expedite prosecution, claim 1 is amended to alleviate the Examiner's concerns. Specifically, claim 1 is amended to recite "wherein said n-type dopant comprises one of Zr, Si, Hf, Ge, Sn, and Ti."

The Examiner also alleges that "exclusively dependent", as is recited in claim 21, is indefinite because other conductivity controlling features exist. However, Applicants respectfully disagree. The original specification clearly supports this exemplary feature at page 15, lines 13-19. The support provided by the specification states that "[i]n order that the thin film may show the p-type conductivity, a p-type dopant needs to be substituted . . . ." Thus, in view of the specification at page 15, lines 13-19, one of ordinary skill in the art would clearly understand the invention of claim 21.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

VI. THE PRIOR ART REJECTIONS

A. The Harwig Reference

Harwig discloses the doping of β-Ga_2O_3 single crystals to influence electrical conductivity of the single crystals (Harwig at page 205). The Examiner alleges that Harwig makes the invention of claims 1 and 19 obvious and that the combination of Harwig and Ichinose makes the invention of claim 16 obvious.

Applicants respectfully disagree. Specifically, Harwig clearly fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of said Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant*", as recited, for example, in claim 1 and similarly in claim 19 (Application at Figure 2). Harwig also clearly fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . growing the Ga_2O_3 system single crystal on the Ga_2O_3 seed crystal such that said predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal to*

obtain a desired resistivity in the Ga_2O_3 system single crystal of 1 X 10^3 Ωcm or greater", as recited, for example, in claim 16 (Application at page 20, line 16 to page 21, line 15).

Harwig describes a temperature dependence of the resistivity in cases where Zr or Mg are doped by mixing Ga_2O_3 having a purity of 4N (the contained impurities are as follows: 100-200 ppm of Si, 20-50 ppm of Ca, 20-50 ppm of Mg, and 50-100 ppm of Al) with ZrO_2 or MgO (Harwig at Figure 1).

However, even assuming (arguendo) that Harwig teaches Ga_2O_3 system single crystal manufactured from bulk growth and that the temperature and pressure during the growth would be obvious, Harwig neither teaches nor suggests a method of controlling a conductivity of a Ga_2O_3 system single crystal, including adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of the Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant.

In addition, the Examiner alleges on page 8 and 9 of the Office Action that the structure and process of Harwig is substantially identical to that of the invention of claims 1 and 19. However, Applicants respectfully submit that this allegation is *clearly incorrect*. Indeed, the Examiner fails to recognize *any* of Applicants' previous arguments with respect to this issue. Applicants have addressed this particular allegation in previous responses. The present Office Action simply restates old allegations regarding inherency and fails to recognize any of the clear and substantial differences between Harwig and the invention of claims 1 and 19 which Applicants have presented.

Specifically, Harwig clearly teaches that only a small amount of Zr or Mg can be added to β-Ga_2O_3. Namely, for example, referring to Harwig, page 206, lines 4-12 of the left column, Harwig teaches that a dopant in the concentration of only about several hundred ppm can be doped, even though a dopant is being intentionally added to β-Ga_2O_3, and that the impurity concentration in the

undoped crystal is, for example, 100-200 ppm in Si. In more detail, Harwig teaches that the conductivity of $10^{-5} - 10^{-3}\ \Omega cm^{-1}$ was obtained when the Zr concentration was 1000 ppm (300-500 K) and the conductivity of $10^{-6} - 10^{-4}\ \Omega cm^{-1}$ was obtained when the Zr concentration was 100 ppm (450-700 K).

In other words, Harwig teaches that, when a dopant is doped into β-Ga_2O_3, only the dopant lower than the impurity concentration level (190-400 ppm) can be doped. This doping capability indicates that, in fact, it is not possible to measure whether the dopant is doped into β-Ga_2O_3, and that the conductivity cannot be controlled by the dopant concentration.

On the other hand, in the invention of claims 1 and 19, when the dopant is doped into β-Ga_2O_3 having high purity (e.g., 6N), the Si dopant concentration is changed to 1×10^{-5}- 1 mol% (0.064-6400 ppm) by changing the doping concentration thereby enabling to substantially linearly change the conductivity to 1.25×10^{-3}-500 $\Omega^{-1}cm^{-1}$.

Thus, the teaching of Harwig is different from the invention of claims 1 and 19. Harwig does not teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal, including adding an n-type dopant to the Ga_2O_3 system single crystal manufactured from bulk growth to change a resistivity of the Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant. Further, in view of the aforementioned facts, the Examiner's allegation with respect to the inherency of the claimed properties and functions is clearly unsupportable and not maintainable. The Examiner's assertion of this allegation without even a response to the Applicants' arguments clearly shows that the Examiner is not interpreting the invention of claims 1 and 19 as would one having ordinary skill in the art.

Further, with respect to the invention of claim 16, Applicants respectfully submit that Harwig clearly fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single

crystal to obtain a carrier concentration in the Ga_2O_3 system single crystal within a range of 5.5 X 10^{15} to 2.0 X $10^{19}/cm^3$ or to obtain a desired resistivity in the Ga_2O_3 system single crystal of 1 X 10^3 Ωcm or greater. Indeed, Harwig certainly fails to teach or suggest the carrier concentration and the desired resistivity of the claimed invention.

On page 12, third paragraph of the Office Action, the Examiner admits that the aforementioned desired resistivity is neither taught nor suggested by Harwig. To make up for these deficiencies, the Examiner alleges that "the combined teaching of Harwig and Ichinose teaches an identical process, such as doping a predetermined dopant to the Ga_2O_3 single system crystal, and an identical material, such as n-type dopant."

However, the Examiner contradicts himself. On page 13, first paragraph of the Office Action, the Examiner admits that the purity of Harwig is not the same as is included in the claimed invention. Thus, there is no rational way Harwig can teach or suggest the desired resistivity and carrier concentration of the claimed invention as the Examiner alleges. Further, since the exemplary features are clearly not taught or suggested by Harwig, there is no rational way the Examiner can allege that the admitted difference is obvious to one of ordinary skill in the art. Applicants respectfully note that this argument was made in the previous response, and the Examiner *failed* to respond to this argument in the present Office Action.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw all rejections based on Harwig.

B. The Ichinose Reference

To make up for the deficiencies of Harwig, the Examiner applies Ichinose. Ichinose discloses a light emitting element (Ichinose at Abstract). The Examiner alleges that the combination of Harwig and Ichinose makes the invention of claims 1, 16, and 19 obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would combine Harwig and Ichinose, the resultant combination fails to teach or suggest all features of the claimed invention. Specifically, Ichinose, like Harwig, clearly fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal to change a resistivity of said Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant*", as recited, for example, in claim 1 and similarly in claim 19 (Application at Figure 2), or "*comprising . . . growing the Ga_2O_3 system single crystal on the Ga_2O_3 seed crystal such that said predetermined dopant is substituted for Ga in the Ga_2O_3 system single crystal to obtain a desired resistivity in the Ga_2O_3 system single crystal of $1 \times 10^3\ \Omega cm$ or greater*", as recited, for example, in claim 16 (Application at page 20, line 16 to page 21, line 15).

Ichinose teaches that Ga_2O_3 single crystal is obtained by a FZ method using a Ga_2O_3 polycrystalline, and that Mg is added (e.g., Ichinose at paragraph [0096]). However, Ichinose clearly fails to make up for the deficiencies of Harwig with respect to the above-referenced exemplary features of the claimed invention. Indeed, the Examiner only asserts that Ichinose is allegedly relevant to the Ga_2O_3 polycrystalline raw material. Thus, the Examiner clearly fails to make a *prima facie* case of obviousness by the alleged Harwig and Ichinose combination.

In addition, the Examiner alleges that the alleged Harwig and Ichinose combination teaches an identical process to that of the claimed invention. As previously mentioned in Section A,

Applicants respectfully submit that this allegation is *clearly incorrect*. Indeed, the Examiner fails to recognize *any* of Applicants' previous arguments with respect to this issue. Applicants have clearly shown that the alleged Harwig and Ichinose combination is in no way identical and possesses no inherencies with respect to any claims of the present invention.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw rejections based on Ichinose.

C. The Ueda Reference

To make up for the deficiencies of Harwig with respect to claims 1 and 19, the Examiner applies Ueda. Ueda discloses the doping of a β-Ga_2O_3 single crystal with Sn (Ueda at Abstract). The Examiner alleges that the combination of Harwig and Ueda makes the claimed invention obvious.

However, even assuming (arguendo) that one of ordinary skill in the art would combine Harwig and Ueda, the resultant combination fails to teach or suggest all features of the claimed invention. Specifically, Ueda, like Harwig, clearly fails to teach or suggest a method of controlling a conductivity of a Ga_2O_3 system single crystal a method of controlling a conductivity of a Ga_2O_3 system single crystal, "*comprising . . . adding an n-type dopant to the Ga_2O_3 system single crystal to change a resistivity of said Ga_2O_3 system single crystal substantially linearly with an added amount of the n-type dopant*", as recited, for example, in claim 1 and similarly in claim 19 (Application at Figure 2).

In Ueda, the conductivity is controlled by changing oxygen partial pressure during a bulk growth of β-Ga_2O_3 using a Ga_2O_3 material having a purity of 4N to which an impurity is not added (Ueda at page 3561, right column, 1-2 lines from the bottom, page 3562, left column, 1-12 lines from the top, and Figure 1).

However, Ueda, in which the conductivity is controlled by changing the oxygen partial pressure, fails to teach or suggest that the conductivity is controlled by changing the doping concentration of the dopant, like that of the claimed invention. This is obvious from Figure 1 of Ueda. Applicants note that, in Figure 1 of Ueda, the conductivity is changed to 0.63-0.9 $\Omega^{-1}cm^{-1}$ by changing an oxygen flow rate to 0.05-0.5 m^3h^{-1}. Thus, Ueda fails to make up for the deficiencies of Harwig and the Examiner fails to make a *prima facie* case of obviousness.

Therefore, Applicants respectfully request the Examiner to reconsider and withdraw rejections based on Ueda.

VII. NEW CLAIMS

New claims 28 and 29 are added to claim additional features of the invention and to provide more varied protection for the claimed invention. These claims are independently patentable because of the novel and nonobvious features recited therein.

Applicants submit that the new claims are patentable over the cited prior art references at least for analogous reasons to those set forth above.

VIII. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicants submit that claims 1, 4, 5, 8, and 14-29, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: September 24, 2009

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